

COURSE TITLE	PETROLEUM EXPLORATION
COURSE CODE	01CH0512
COURSE CREDITS	3

Objective:

- 1 To gain the fundamental knowledge of petroleum exploration, different methods of geophysical surveys and instruments used for it.

Course Outcomes: After completion of this course, student will be able to:

- 1 Understand the various concepts of petroleum exploration practices
- 2 Analyze the geochemical aspects of petroleum exploration
- 3 Examine the gravity, magnetic, seismic and resistivity data for exploration
- 4 Interpret seismic refraction and reflection data for exploration purposes

Pre-requisite of course: Basic Mathematics, Physics, Earth Science, Chemistry

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Fundamentals of Petroleum Exploration Introduction to Petroleum Exploration, Nature of Petroleum, New Exploration Licensing Policy (NELP), Overview of petroleum exploration in India and other countries, Techniques of Petroleum Exploration, Geochemical, Gravity, Magnetic, Electrical and seismic method of hydrocarbon exploration	8
2	Geochemical approaches Geochemical seeps, Classification of seeps, Weathering of seeps, Surface Reconnaissance, Hydrocarbon Mud Logging, Rock Pyrolysis, Understanding S1, S2, S3, S1/S1+S2, Production Index, Hydrogen Index and Oxygen Index, Processing and interpretation of Geochemical data	12

Contents : Unit	Topics	Contact Hours
3	Concepts of seismic methods Body waves and surface waves, Rayleigh, Love, P and S wave, Seismic acquisition principle, Seismic refraction and reflection surveys, Land and marine sources, Geophone, Hydrophone and Vibroseis survey, Seismic Fold, Signal and Noise, Seismic Processing, 2D and 3D seismic, inline and cross line, 3D fold, time slice and its importance, Horizon and Fault mapping, Seismic impedance and reflection coefficient, convolution and autocorrelation, Fault skeleton preparation, wrench system Structural and Stratigraphic interpretation, Synthetic generation, Time and depth map, VSP survey, Attributes: Amplitude, Frequency and Sweetness, AVO analysis, Classification of sands, Rock solid attributes	12
4	Gravity and Magnetic Methods Basic concepts of Gravity/Magnetic methods: Newton's gravitational law, Units of gravity, Instruments of G&M survey, Gravity and magnetic data correction, Interpretation of G&M anomaly, Correlation of Gravity anomaly with seismic anomaly, Electrical properties of hydrocarbon, Electrical conductivities, Resistivities of various lithologies, Dielectric constants, land airborne EM, Interpretation and modeling of data, Basic well logs	10
Total Hours		42

Textbook :

- 1 Petroleum Exploration Hand Book, Moody, G.B., McGraw-Hill Inc, 1961
- 2 Petroleum Exploration: Techniques and Technologies, Chase Jones, Larsen and Keller Education, 2017
- 3 Hydrocarbon exploration and production , Jahn, F., Cook, M., & Graham, M, Elsevier Publications, 2008

References:

- 1 Applied hydrodynamics in petroleum exploration, Applied hydrodynamics in petroleum exploration, Dahlberg, E. C. , Springer Science & Business Media, 2012
- 2 Nontechnical guide to petroleum geology, exploration, drilling, and production, Nontechnical guide to petroleum geology, exploration, drilling, and production, Hyne, N. J. , Tulsa, OK: Penn Well Corporation, 2001

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery
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Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

- 1 <https://petex.utexas.edu/courses/course-list/143-general/281-petroleum-fundamentals>